EFFECTS OF FORMALDEHYDE EXPOSURE ON UPPER RESPIRATORY TRACT CANCERS: WEIGHT OF EVIDENCE

Thomas F. Bateson, *U.S. Environmental Protection Agency, Washington, DC, USA*
Jennifer Jinot, *U.S. Environmental Protection Agency, Washington, DC, USA*
Ravi P. Subramaniam, *U.S. Environmental Protection Agency, Washington, DC, USA*
Danielle DeVoney, *U.S. Environmental Protection Agency, Washington, DC, USA*
Suryanarayana V. Vulimiri, *U.S. Environmental Protection Agency, Washington, DC, USA*
John Whalan, *U.S. Environmental Protection Agency, Washington, DC, USA*

Background and Aims: Formaldehyde is ubiquitous in ambient and indoor air. Human exposure primarily results from off-gassing of processed wood products and as a combustion by-product. Evidence of carcinogenicity beyond nasopharyngeal cancer (NPC) includes other site-specific relationships in the upper respiratory tract (URT).
Methods: We systematically evaluated the epidemiologic literature on the relationship between formaldehyde exposures and URT cancers.
Results: The National Cancer Institute cohort study of 25,619 workers exposed to formaldehyde reported increased NPC mortality risk (SMR=2.1, 95% CI: 1.05-4.21) and demonstrated exposure-response relationships with cumulative exposure to formaldehyde (*p-trend*=0.025) and peak exposure to formaldehyde (*p-trend*<0.001). These results were substantiated by a robust collection of exposure-response results from case-control studies. Luce et al. (2002) pooled standardized data from 12 separate studies of sinonasal cancer providing the strongest evidence that formaldehyde is associated with sinonasal cancer. Together with the NPC findings in the neighboring tissue of the URT, this is evidence of a causal association of formaldehyde exposure with sinonasal cancer. The evidence for a specific effect on the risks of buccal, oropharyngeal, hypopharyngeal, and laryngeal cancers is slight when examining each of these extremely rare URT endpoints individually. However, the large NCI study showed a statistically significantly increased risk for URT cancers as a group and for buccal cavity cancers. Further evidence includes a nearly 4-fold increased risk of hypopharyngeal cancer (Laforest et al., 2006) and the demonstration of an exposure-response relationship for duration of formaldehyde exposure and risk of laryngeal cancer (Shangina et al., 2006).
Conclusions: We conclude that there is causal evidence for NPC and sinonasal cancer in neighboring tissues of the URT and the other sites of first contact with inhaled exposure to formaldehyde and these collective results support a broader pattern of carcinogenicity within the URT.

Disclaimer: This abstract does not necessarily reflect EPA policy.

References:

Hauptmann M, Lubin JH, Stewart PA, et al. Mortality from solid cancers among workers in formaldehyde industries. Am J Epidemiol 2004;159:1117–1130.
Laforest L, Luce D, Goldberg, P, et al. Laryngeal and hypopharyngeal cancers and occupational exposure to formaldehyde and various dusts: a case-control study in France. Occup Environ Med 2000;57:767–773.
Luce, D, Leclerc A, Begin D, et al. Sinonasal cancer and occupational exposures: a pooled analysis of 12 case-control studies. Cancer Causes Control 2002;13:147–157.
Shangina O, Brennan P, Szeszenia-Dabrowska N, et al. Occupational exposure and laryngeal and hypopharyngeal cancer risk in central and eastern Europe. Am J Epidemiol 2006;164(4):367–375.